REMARKS

In response to the non-final Office Action dated October 19, 2007, Applicant respectfully requests reconsideration. Claims 1-119 were previously pending in this application. By this amendment, claim 49 has been amended. No claims have been canceled or added. As a result, claims 1-119 are pending for examination with claims 1, 33, 61, 91 and 117 being independent.

I. Claim Objections

The Office Action rejects claims 43 and 74 because the claims recite an S11 parameter and the specification allegedly discloses only an S1 parameter. Applicant respectfully points to the specification at page 26 *et. seq.* Lines 15-25 introduce the S11 parameter and lines 29 and 30 describe the notation. In particular, the specification states that the notation S_{ij} will be used to indicate the S-parameter measured in the j^{th} coil in response to operating the i^{th} coil. Thus, the S11 parameter refers to the S-parameter measured at the first coil in response to operating the first coil. Accordingly, Applicant believes claims 43 and 74 are correct as originally presented, and respectfully requests that the objection to the claims be withdrawn.

II. Rejections Under 35 U.S.C. §102

The Office Action rejects claims 1-119 under 35 U.S.C. §102(e) as allegedly being anticipated by US Patent No. 6,477,398 (Mills). Applicant respectfully disagrees.

A. Claims 1-32 and 61-90

The Office Action asserts that Mills discloses "detecting a change in at least one resonant property of at least one of the coils in the array" in col. 2, line 26 through col. 5 line 17, col. 27 line 57 through col. 33 line 21, and column 54 line 21 through col. 59 line 16 (Office Action, page 2). That is, the Office Action cites thirteen columns of disclosure without pointing to any specific teaching that meets the above quoted limitation. This type of omnibus rejection makes it difficult to determine precisely what disclosure in Mills the Office Action is alleging meets the limitation of the claims. The MPEP requires that rejections be fully and clearly stated, and recommends avoiding such omnibus rejections because they are not informative (MPEP §707.07(d)). In any event, Mills

nowhere in the above cited portions, nor anywhere else, discloses or suggests detecting a change in at least one resonant property of at least one of the coils in the array.

Mills is directed to detecting a RF field generated by nuclei that have first been magnetized in a primary magnetic field by, for example, a super-conducting magnetic and then re-aligned in a RF field to generate a nuclear magnetic resonance (NMR) effect (column 3, lines 21-55 and col. 12, lines 1-34). The precessing nuclei release RF energy related to the precession rate (i.e., the Larmor frequency) of the nuclei, which is indicative "magnetic susceptibility" (col. 4, line 47 – col. 5, line 17). In Mills, the subject matter being detected is the RF signals generated by the volume units of the magnetized body. Nowhere is a change in a *resonant property of the detectors* being detected, determined or otherwise measured.

Resonant coils have a particular frequency at which they resonate that depends on the properties of the coil (e.g., the parameters of the LCR circuit forming the coil) (Specification, page 7, lines 5-21). Applicant has appreciated that this resonant frequency changes when in the presence of a load, and has developed techniques to infer properties about the load from changes in resonant properties of the coil related to the resonant frequency (Specification, page 6, lines 16-21). That is, measuring changes in resonant properties of the *coils themselves* provides the information to compute properties of the loading body. This is an entirely different imaging paradigm than disclosed in Mills, which operates in the conventional manner of MRI in that it detects signals generated by a magnetized object being imaged, not by measuring changes in the properties of the detectors themselves. Specifically, Mills is completely silent with respect to measuring changes in one or more *resonant properties* of resonant coils.

Claim 1 recites a method of determining one or more properties of a body positioned proximate an array of coils having one or more resonant properties, the method comprising acts of detecting a change in at least one resonant property of at least one of the coils in the array, and determining at least one electromagnetic property of at least one region of the body from the change in the at least one resonant property.

Nowhere does Mills disclose nor suggest "detecting a change in at least one resonant property of at least one of the coils in the array," as recited in claim 1. Therefore, Mills also does not disclose or suggest "determining at least one electromagnetic property of at least one region of

the body from the change in the at least one resonant property," as further recited in claim 1. Therefore, claim 1 patentably distinguishes over Mills and is in allowable condition.

Claims 2-32 depend from claim 1 and are allowable based at least on their dependency.

Claim 61 recites an apparatus for determining one or more properties of a body, the apparatus comprising a plurality of coils having one or more resonant properties, a first component coupled to the plurality of coils and adapted to provide at least one measurement of the plurality of coils indicative of a change in at least one resonant property of at least one of the plurality of coils, and a second component coupled to the first component to receive the at least one measurement, the second component adapted to determine at least one electromagnetic property of at least one region of the body based on the change in the at least one resonant property.

Nowhere does Mills disclose nor suggest a first component coupled to the plurality of coils and adapted to "provide at least one measurement of the plurality of coils indicative of a change in at least one resonant property of at least one of the plurality of coils," as recited in claim 61. Therefore, Mills nowhere discloses or suggests "a second component to "determine at least one electromagnetic property of at least one region of the body based on the change in the at least one resonant property," as further recited in claim 61. Therefore, claim 61 patentably distinguishes over Mills and is in allowable condition.

Claims 62-90 depend from claim 61 and are allowable based at least on their dependency.

B. Claims 33-60 and 91-116

The Office Action asserts that figures 1a, 1b, 8 and 13 disclose determining at least one electromagnetic property of at least one region of the body based on at least two of a resistive coupling, a capacitive coupling, and an inductive coupling between at least two of the plurality of coils (Office Action, page 3). Applicant respectfully disagrees. Initially, Applicant points out that the Office Action does not even allege which components in FIGS. 1a and 1b are being interpreted as the "array of coils", as none of the components are described as coils in these drawings. While FIGS. 8 and 13 clearly show a number of coils, they are not shown or described as being used to determine electronmagnetic properties of the body. In particular, coils 6 provide the steady primary magnetic field B0, coils 7 provide a gradient field in the x-direction, coils 8 provide a gradient field in the y-direction and coils 10 provide a gradient field in the z-direction (col. 27, line 57 – col. 28,

line 42). These coils merely provide the magnet fields for magnetizing the body and gradient fields for localization, they don't determine or detect anything. Moreover, coils 9 provide the RF field used to rotate the magnetization vector (col. 28, lines 5-10). As with the main magnetization coils, coils 9 do not determine any properties of the body. Rather, these coils are used solely to generate the NMR effect to excite specific nuclei.

Furthermore, RF coils 30, which actually do determine properties of the object, detect the free induction decay (FID) signals emitted from the object. That is, the RF coils 30 sense the NMR signals released by the precessing nuclei. It should be appreciated the components in FIGS. 1a and 1b (which are not described as coils) are described as performing the same operations. That is, magnet 112 provides the primary magnetization field, a radiation source 118 provides the RF pulse to polarize selected nuclei of the body, and detector 120 detects the RF radiation emitted from the excited nuclei (column 12, lines 1-34). There is absolutely no teaching in the figures or the accompanying disclosure that teaches determining an electromagnetic property of a body based on the coupling between the coils.

In fact, the only mention of coupling between magnetic field generators, RF generators or detectors is found in column 20, lines 31-33, which state "[i]n an embodiment, cross talk between antennas is ameliorated or eliminated by time multiplexing the signal detection over the array of antennas." Indeed, Mills teaches that cross-talk between detectors is undesirable noise and provides methods to reduce or eliminate it. That is, not only does Mills not teach using the coupling between coils to determine properties of the body, Mills teaches that any such coupling is considered undesirable noise that is deleterious to detecting the emitted NMR signals. Accordingly, there is absolutely no teaching in Mills having anything to do with determining an electromagnetic property of a region of a body based on a coupling between coils.

Claim 33 recites a method of determining one or more properties of a body, the method comprising acts of positioning the body proximate a plurality of coils, measuring at least one property of at least one of the plurality of coils, and determining at least one electromagnetic property of at least one region of the body from the at least one property based on at least two of a resistive coupling, a capacitive coupling, and an inductive coupling between at least two of the plurality of coils.

Nowhere does Mills disclose nor suggest "determining at least one electromagnetic property of at least one region of the body from the at least one property based on at least two of a resistive coupling, a capacitive coupling, and an inductive coupling between at least two of the plurality of coils," as recited in claim 33. Therefore, claim 33 patentably distinguishes over Mills and is in allowable condition.

Claims 34-60 depend from claim 33 and are allowable based at least on their depedency.

Claim 99 recites an apparatus for determining one or more properties of a body, the apparatus comprising a plurality of coils, a first component coupled to the plurality of coils, the first component adapted to provide at least one measurement of at least one property of the plurality of coils, and a second component coupled to the first component to receive the at least one measurement, the second component adapted to determine at least one electromagnetic property of at least one region of the body from the at least one measurement based on at least two of a resistive coupling, a capacitive coupling, and an inductive coupling between two or more of the plurality of coils.

Nowhere does Mills disclose nor suggest a first component "to determine at least one electromagnetic property of at least one region of the body from the at least one measurement based on at least two of a resistive coupling, a capacitive coupling, and an inductive coupling between two or more of the plurality of coils," as recited in claim 91. Therefore, claim 91 patentably distinguishes over Mills and is in allowable condition.

Claims 92-116 depend from claim 91 and are allowable based at least on their dependency.

C. Claims 117-119

The Office Action asserts that the appendices of the disclosure, the text of col. 11 line 34 through col. 82 line 14, and the exemplary reconstruction program of column 42-54 disclose the subject matter of claim 117 (Office Action, page 12). Again, the Office Action has set forth an omnibus rejection citing nearly the entirety of the Mills disclosure without indicating where in the disclosure each of the limitations is allegedly disclosed. Applicant has carefully read Mills and can find no teaching whatsoever related to "defining an electromagnetic model of the coil array," "receiving an input including a measured impedance matrix of the coil array," "assigning trial values respectively to each of the plurality of regions, the trial values including at least one of

conductivity, permittivity and permeability," "generating a trial impedance matrix from the assigned trial values according to the electromagnetic model of the coil array," or "reducing a distance between the trial impedance matrix and the measured impedance matrix," all limitations of which are recited in claim 117. Therefore, claim 117 patentably distinguishes over Mills and is in allowable condition.

Claims 118 and 119 depend from claim 117 and are allowable based at least on their dependency.

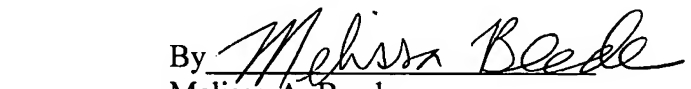
CONCLUSION

A Notice of Allowance is respectfully requested. The Examiner is requested to call the undersigned at the telephone number listed below if this communication does not place the case in condition for allowance.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicant hereby requests any necessary extension of time. If there is a fee occasioned by this response, including an extension fee, that is not covered by an enclosed check, please charge any deficiency to Deposit Account No. 23/2825.

Dated: March 19, 2008

Respectfully submitted,

By 

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